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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Singer, et al. Examiner: Kevin Nguyen
Application No.: 09/262,781 Group: 2173
Filed: March 4, 1999
For: DYNAMIC SYSTEM CONTROL METHOD

PETITION TO MAKE SPECIAL

The applicants of the above identified patent application hereby petition to make this application special pursuant to M.P.E.P. § 708.01, subsection VIII. Please charge the \$130 fee set forth in 37 CFR 1.17(i) and any additional fees to our deposit account number 03-1721. This application has not received any examination by the Examiner.

This petition to make special is with respect to the following pending claims, all of which are directed to a single invention. If the Office determines that the presented claims are not all directed to a single invention, applicants will make an election without traverse as a prerequisite to the grant of special status. The presented claims are claims 1-61. These claims have been renumbered in this divisional application, but correspond to Claims 1-29, 62-90, and 127-129 of Application Ser. No. 09/262,781 to which this petition and the accompanying divisional application claim priority. (A petition was granted on September 15, 2000, "Making Special" Claims 148-151, 156, 159-161, 164, 167, and 187-192 of Application Ser. No. 09/262,781.)

The presented claims are directed to technology allowing the use of a position-versus-velocity ("PV") table and either a shaped velocity command or trajectory to control movement of a dynamic system such as a data storage device to reduce mechanical and/or acoustic unwanted vibrations. Although some disk drives rely on PV tables to determine their inputs, the inputs can result in unwanted vibrations to the

systems. The techniques presented and claimed in the invention to reduce and/or limit such vibrations are not known in the prior art. In particular, independent claim 1 is directed to a control method including shaping a velocity command determined using a PV table. Independent claim 6 is directed to a control method including generating and storing a trajectory, defining a system velocity in terms of system position and one or more additional variables, in a PV table having $N > 2$ dimensions. Independent claim 10 is directed to a control method including generating and storing a plurality of such trajectories. Independent claim 14 is directed to a control method wherein the trajectory-generating step generates the trajectory in accordance with a technique for reducing unwanted dynamic system vibrations. Independent claim 59 is directed to a method for generating a PV table by storing a trajectory generated by integrating a partial fraction expansion equation model of the dynamic system. Independent claims 30, 35, 39 and 43 are directed to apparatus embodying the novel methods in claims 1, 6, 10, and 14 respectively.

Applicants hereby state that a pre-examination search was made by a foreign patent office. In particular, the European Patent Office performed a search and a copy of the International Search Report accompanies this petition along with copies of the five references cited. It is submitted that this international search meets the requirement for a pre-examination search. These cited references will now be discussed.

European patent application No. 0 441 407 A1 teaches a system for positioning a transducer in which acceleration and deceleration profiles are established by minimizing the square of acceleration which serves as a cost function. Target position, target velocity and target acceleration are represented by polynomials which result from the acceleration

and deceleration patterns which minimize the integral of the acceleration squared.

Neither page 5 lines 16-56, pointed out by the European Examiner, nor any other portion of this reference discloses the shaped velocity or trajectory methods, or the $N (N>2)$ dimensional PV table set forth in the claims being presented herein for special status.

US patent no. 5,696,647 discloses various techniques for carrying out seeks in a disk drive to limit acoustic noise arising from changes in acceleration of the actuator.

Acoustic noise is suppressed by limiting the acceleration of the actuator that supports the transducer, by limiting a control signal to be outputted to the actuator driver and having a component that is determined from the difference between a profile velocity and an estimate of the radial velocity of the transducer across the disc surface. This reference is strictly limited to design techniques for controlling acoustic noise in a disk drive. The reference teaches merely feeding forward the velocity into the system, while the claims present herein for special status include shaping the velocity before it is provided into the system and, in addition, inverse shaping in the system's feedback loop. Neither column 6 line 59 through column 8 line 57, pointed out by the European Examiner, nor any other portion of this reference discloses the shaped velocity or trajectory methods, or the $N (N>2)$ dimensional PV table set forth in the claims being presented herein for special status.

European patent application No. 0 543 654 A2 is directed to a positioning control system for a magnetic head which estimates an arrival time that the controlled device takes from a current position to a designated position and to set the estimated arrival time as a target moving time when the control device is positioned at the designated target position. The positioning control system enables the controlled device such as a

magnetic head to be positioned stably and at high speed. Although the positioning control system includes a trajectory generating means, the manner trajectories are generated is different from and less robust than the methods set forth in the claims being presented herein for special status.

European application No. 0 308 062 is directed to a disk file digital control system that incorporates means for measuring the time between samples of read/write head position error signals and uses a value of that measured time as part of the computation of a digital control signal. The system results in improved performance in moving the head to a target track when there is variation in the nominal position error signal sampling time caused by variations in the disk file drive motor speed. Again, there is no teaching whatsoever concerning shaped velocity or trajectory methods, or the N ($N > 2$) dimensional PV table set forth in the claims being presented herein for special status.

UK patent application No. GB 2303732A is directed to a head velocity/position estimator. An estimator estimates current head velocity and compares the estimated head velocity with a velocity command. Head movement is controlled based on the difference between the commanded velocity and the estimated head velocity. As with the other references discussed herein, this reference is entirely lacking any teaching of shaped velocity or trajectory methods, or N ($N > 2$) dimensional PV tables.

It is submitted that all of the elements set forth in M.P.E.P. §708.02 subsection VIII have now been provided in this petition to make special. It is requested that this petition be granted and that the presented claims be examined as soon as possible.

Respectfully submitted:



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